



MS LYNN WHITESIDE

**PROPOSED RESIDENTIAL DEVELOPMENT AT FORMER
BUILDERS YARD, STANE STREET, SLINFOLD**

NOISE IMPACT ASSESSMENT

TECHNICAL REPORT: RFE-0433-22-01

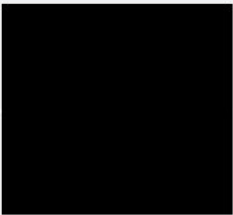
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	Name	Position	Signature	Date
Prepared By	Jamie Pearson	Senior Acoustic Consultant		12/05/2022
Reviewed By	Richard Fenton	Director		13/05/2022
For and on behalf of RF Environmental Ltd				

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1 INTRODUCTION

RF Environmental Ltd (RFE) was commissioned by Ms Lynn Whiteside in April 2022 to prepare an acoustic report to support a planning application to Horsham District Council (HDC) for the proposed residential development at a Former Builders Yard located on Stane Street, Slinfold, West Sussex, RH13 ORE.

To support this application, a noise impact assessment has been carried out, using noise criteria contained within the Sussex Planning Noise Advice Document, along with criteria contained in British Standards BS 8233:2014, BS 4142:2014+A1:2019 and World Health Organisation guidelines on noise.

The existing site and proposed development are described in the following section of this report, whilst the legislation and criteria used for the assessment are included within Section 3. The noise surveys are presented in Section 4, whilst the noise assessment is addressed in Section 5. A scheme of noise mitigation is presented in Section 6 and finally, the conclusions of this study are summarised in Section 7. Figures and Tables are presented in Appendix A and B, respectively. A description of useful acoustic terms can be found in Appendix C.

The report has been produced by Jamie Pearson (MIOA) and reviewed by Richard Fenton (MIOA, MCIEH). Jamie and Richard are experienced in the production of noise impact assessments and have produced a significant number of assessments in consultancy roles and reviewed them in local authority roles.



2 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 Site Description

The proposal site currently comprises the former open builder's yard and is bounded by Mead Cottage to the west, with Stane Street (A29) located beyond.

Spring Corpse Business Park is located directly to the north of the site.

To the east is an area of woodland, with the Slinfold Business Park further beyond that takes access direct from the A29 from Maydwell Avenue.

To the south west of the site is a single residential dwelling. This is a new build property with access off Maydwell Avenue.

The proposed development site is illustrated in Figure A1 of Appendix A.

2.2 Proposed Development

The proposed site plan is presented in Figure A2 of Appendix A.

The planning application proposes to re-establish planning permission for a single two-storey four bedroom dwelling, previously granted approval at appeal in 2013. The dwelling proposed is identical to that previously approved.

The development would utilise the existing Maydwell Avenue access which has already been constructed.

The proposed floor plans and elevations are presented in Figures A3 to A6 of Appendix A.

2.3 Subjective Observations

Subjective observations undertaken on site indicate that the main sources of noise affecting the site is road traffic on Stane Street (A29). However, it was noted that the site benefits from the screening provided by a 4 m high noise barrier between the boundary of the dwelling located directly to the south west of the site and the A29.

Occasional commercial noise sources from the adjacent industrial premises were observed during the collection of the noise monitoring equipment and attended noise monitoring on Wednesday 4th May 2022.

It is noted that a planning condition attached to Application No. DC/20/0279¹ for erection of additional industrial units on the Spring Corpse Business Park required the applicant to provide a scheme of noise mitigation measures to ensure that noise emitted from the proposed building services plant is 5 dB less than background, when assessed within

¹ DC/20/0279. Spring Corpse Business Park, Units 1 To 7 and 6B. May 2020.



accordance with BS4142:2014. No noise from building services plant was observed during site attendance.

Other sources of environmental noise observed on site was from overhead aircrafts and birdsong.



3 ASSESSMENT CRITERIA

3.1 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England (March 2010)², sets out the long-term vision of Government noise policy.

The vision of the NPSE is to ‘Promote good health and a good quality of life through the effective management and control of noise within the context of Government policy on sustainable development.’ This vision is supported by three key aims:

- avoid significant adverse impacts on health and quality of life;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

The NPSE should apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise but does not apply to noise in the workplace (occupational noise).

The NPSE had adopted the following concepts, to help consider whether noise is likely to have ‘significant adverse’ or ‘adverse’ effects on health and quality of life:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

However the NPSE goes on to state that:

‘it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.’

² Department for Environment, Food and Rural Affairs (DEFRA). Noise Policy Statement for England (NPSE), 2010.

3.2 National Planning Policy Framework

The NPPF 2021³, which refers to the “Explanatory Note in the in the NPSE, does not include specific noise criteria to be applied in planning decisions. It contains the following relevant guidance relating to noise and development:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:...

(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans...

185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

(a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and quality of life; and

(b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason...

187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

188. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

³ Department of Communities and Local Government. National Planning Policy Framework, 2021

3.3 Planning Policy Guidance

Planning Practice Guidance (PPG) on noise was issued in March 2014 and updated in July 2019⁴. This web-based guidance advises local planning authorities that *“Noise needs to be considered when new developments may create additional noise (including any anticipated changers to that environment from activities that are permitted but not yet commenced)...”* It states that...

“noise can override other concerns, where justified, although it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect on whether noise is likely to pose a concern”

“...but neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the NPSE) expects noise to be considered in isolation, separately from the economic social and other environmental dimensions of proposed development.” (paragraph 002)

As regards planning decisions, the PPG advises that the decision taker ‘should take into account the acoustic environment, and in doing so consider the following:

- *whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.*

“In line with the explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation.” (paragraph 003)

The PPG paragraph 004 refers to the NSPE ‘observed effect level’, while paragraph 005 sets out the noise exposure hierarchy which is based on the ‘likely average response,’ and gives example outcomes. The hierarchy table is presented in Table 3.1 below.

The hierarchy table provides guidance regarding how the concept of SOAELs and LOAELs, introduced through the NPSE, can be applied; and allows for informed subjective perceptions to be made in respect of the noticeability of noise in the context of potential effect levels. The PPG states that *“Although the word ‘level’ is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of the day the noise occurs”*.

⁴ Department for Communities and Local Government: Planning Practice Guidance – Noise paragraph 001 Ref. ID: 30-001-20140306. Revision date July 2019.

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Adverse Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present of disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

TABLE 3.1: PPG NOISE EXPOSURE HEIRARCHY

(Source – Planning Practice Guidance)

3.4 Local Authority Requirements

Local Authorities in Sussex, including Horsham District Council (HDC), have produced a planning guidance document 'Planning Noise Advice Document – Sussex⁵ which sets out the required approach for undertaking a noise assessment, for certain types of development.

For new residential dwellings, the guidance presents information which states:

'Where the noise assessment has shown that habitable rooms will be exposed to noise levels likely to give rise to any adverse impact, noise mitigation will be required.

Design control measures should aim to meet the recommended standards set out in table 4 of BS 8233:2014 and the night time L_{Amax} level recommended in the WHO's Night Noise

⁵ The Planning Noise Advice Document: Sussex. 2021.

Guidelines for Europe (2009), unless there are particular reasons why this is not considered appropriate. In such cases, a clear explanation of the reasons should be provided.

While it is acknowledged that noise mitigation measures can be used in a lot of cases to achieve suitable internal levels, it is important that preference is given to criteria based on windows being partially open.

If it is not possible to achieve suitable internal levels with the windows opened then details of alternative ventilation must be supplied. Where the noise assessment has shown that habitable rooms will be exposed to noise levels likely to give rise to any adverse impact, noise mitigation will be required'

Reference to the rating of commercial noise sources, in line with British Standard 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound⁶ is also provided.

The Planning Noise Advice Document for Sussex also states that:

"The rating level of the plant should, where practicable, be no greater than the existing background levels, when measured in accordance with BS 4142".

3.5 British Standard BS8233:2014

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings⁷ gives recommendations for the control of noise in and around buildings. The Standard suggests appropriate criteria and limits for different situations to guide the design of new or refurbished buildings undergoing a change of use.

Desirable upper noise levels inside residential habitable rooms are specified in the Standard and are reproduced below in Table 3.2.

Activity	Room	Ambient Indoor Noise Level 07:00 to 23:00 hrs, dB LAeq,16 hr	Ambient Indoor Noise Level 23:00 to 07:00 hrs, dB LAeq,8 hr
Resting	Living Room	35	-
Dining	Dining room/ area	40	-
Sleeping (daytime resting)	Bedroom	35	30

TABLE 3.2: BS8233 DESIRABLE INDOOR AMBIENT NOISE LEVELS FOR DWELLINGS

Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

⁶ British Standard BS4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound.

⁷ British Standard BS 8233: 2014. Guidance on sound insulation and noise reduction in buildings.

In external amenity spaces, such as private gardens and patios, BS 8233 indicates that it is desirable that the external noise level in these areas does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ in noisier environments.

3.6 World Health Organisation

The most recent WHO guidelines '*Environmental Noise Guidelines for the European Region*'⁸ acknowledge that 'single event noise indicators such as the maximum sound pressure level are warranted in specific situations such as night time railway or aircraft noise events that can clearly elicit awakenings', however, the guidance indicates that 'the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative' and therefore does not make any recommendations for single event noise indicators.

However, guideline values for community noise in specific environments are presented in the WHO's '*Guidelines for Community Noise*'⁹ document. The guideline values are presented in Table 3.3.

Specific Environment	Critical Health Effect(s)	dB $L_{Aeq,T}$	Time Base hours	dB $L_{Amax,F}$
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

TABLE 3.3: WHO GUIDELINE NOISE VALUES

Note 1: For a good sleep, the WHO states that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night.

The Night Noise Guidelines (NNG) for Europe¹⁰ is described as an extension of the WHO Guidelines for Community Noise publication. The threshold levels of noise exposure presented in the document are described as milestones in the process of evaluating the health consequences of environmental exposure. The health-based guideline values for the assessment and control of night noise exposure were derived from a review of available scientific evidence on the health effects of night noise. These include the effects and threshold levels for night time $L_{Amax,F}$, which are lower than those presented in the WHO community noise guidelines. These revised levels are presented in Table 3.4 below.

Effect	Description	Indicator	NOEL Threshold
Sleep Quality	Waking up in night and/or too early in the morning	dB $L_{Amax,F}$	42

TABLE 3.4: WHO NIGHT-TIME NOISE GUIDELINES

⁸ World Health Organisation. 2018. Environmental Noise Guidelines for the European Region.

⁹ World Health Organisation. 1999. Guidelines for Community Noise.

¹⁰ World Health Organisation. Night Noise Guidelines for Europe. 2009.

3.7 British Standard BS4142:2014+A1:2019

Guidance on the rating and assessing of sound of an industrial and/or commercial nature is contained in British Standard (BS) 4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'¹¹

The standard states that:

This standard is applicable to the determination of the following levels at outdoor locations

- a) rating levels for sources of sound of an industrial and/or commercial nature; and*
- b) ambient, background and residual sound levels*

for the purposes of:

- 1. investigating complaints;*
- 2. assessing sound from proposed, new, modified or additional source(s) of sound of an industrial nature and/or commercial nature; and*
- 3. assessing sound at proposed new dwellings or premises used for residential purposes.*

The determination of noise amounting to a nuisance is beyond the scope of this British Standard.

The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs.

Typically, the greater the difference between rating level and background noise level, the greater the magnitude of the impact:

- a difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- a difference of around +5 dB is likely to be an indication of an adverse impact depending on context; and
- the lower the rating level is relative to the measured background sound level, the less likely it is that the specific source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

¹¹ British Standard BS4142:2014: Methods for rating and assessing industrial and commercial sound.



Certain acoustic features can increase the significance of the impact of a specific sound source. These features include tonality and impulsivity, as well as additional characteristics and intermittency of the sound.

Where appropriate, a rating penalty for sound based on a subjective assessment of its characteristics should be established. In other circumstances an objective appraisal of tonal and/or impulsive characteristics may be appropriate.

It is also stated in the Standard that *'where a new noise sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise sensitive receptor and the extent of required mitigation'*.

4 ENVIRONMENTAL NOISE SURVEY

4.1 Unattended Baseline Noise Survey

Unattended continuous monitoring of existing noise levels was undertaken at the monitoring location shown as N1 on Figure A1 of Appendix A. The equipment used during the survey is presented in Table 4.1 below.

Manufacturer	Model No.	Description	Serial No.	Calibration Due Date
Larson Davis	LxT	Sound Level Meter	0004968	April 2024
Larson Davis	CAL200	Acoustic Calibrator	12981	April 2023

TABLE 4.1: SOUND MONITORING EQUIPMENT

The sound level meter was powered by dry cell batteries and stored inside a weatherproof security box.

Measurements were obtained using the 'F' time weighting and A-weighting frequency network. The equipment was calibrated before and after the survey to generate a calibration level of 114.0 dB at 1 kHz.

15-minute measurements of $L_{Amax,F}$, $L_{Aeq,15min}$ and $L_{A90,15min}$ noise levels were obtained at this monitoring location between 10:45 hrs Thursday 28th April 2022 and 07:00 hrs Wednesday 4th May 2022, with the microphone position set at a height of approximately 1.8 m above local ground level in free-field conditions.

1-minute $L_{Amax,F}$ noise levels were also obtained.

A photograph of the N1 equipment is presented below in Figure 4.1.



FIGURE 4.1: PHOTOGRAPH OF UNATTENDED NOISE MONITORING EQUIPMENT, N1

4.2 Attended Noise Measurements

Supplementary attended short-term noise measurements were obtained at monitoring location N1, to measure the specific noise levels from the existing commercial noise sources.

The attended measurements were obtained between 12:30 hrs and 13:30 hrs on Wednesday 4th May 2022 using the sound level meter described above in Table 4.1.

To The attended noise monitoring was undertaken using the equipment presented above in Table 4.1.

The sound level meter was configured to measure A-weighted noise indices, which included $L_{Amax,F}$, $L_{Aeq,5min}$ and $L_{A90,5min}$ levels.

In order to capture noise from the commercial premises in absence of road traffic noise and other sources, measurements of $L_{Aeq,10sec}$ were also obtained over the attended monitoring period.

In order to measure the difference in sound levels between ground and first floor height, sample noise measurements were also obtained with a second sound level meter at a height of approximately 3m above local ground using the equipment presented below in 4.2.

Manufacturer	Model No.	Description	Serial No.	Calibration Due Date
Norsonic	NOR-140	Sound Level Meter	140326	December 2023

TABLE 4.2: SOUND MONITORING EQUIPMENT – ATTENDED SOUND MONITORING

The sound level meter was configured to measure A-weighted noise indices, which included $L_{Amax,F}$, $L_{Aeq,5min}$ and $L_{A90,5min}$ levels.

The clocks on both sound level meters were synchronised.

Analysis indicates there was only a +0.4dB increase in sound levels at first floor height. As such, no further analysis has been presented in this report.

All noise measurements were made in free-field conditions.

A photograph taken during the attended noise monitoring is presented overleaf in Figure 4.2.



FIGURE 4.2: PHOTOGRAPH OF NOISE MONITORING EQUIPMENT DURING ATTENDED NOISE MONITORING

4.3 Weather Conditions

Weather conditions during the site visits are presented below in Table 4.3.

Site Visit	Date and Time	Noted Weather
Noise monitor setup	28/04/2022 10:30hrs	Dry and no rain; 10°C; 73% humidity; average windspeeds <1m/s.
Attended noise monitoring and collection	04/05/2022 12:15hrs	Dry and overcast; 15°C; 72% humidity; average windspeeds <0.5m/s.

TABLE 4.3: WEATHER CONDITIONS DURING SITE VISITS

A history of the weather conditions during the continuous noise survey period has been obtained from an internet source (Slinfold - IUNITEDK299 www.wunderground.com). Analysis of the data during the noise survey period between Thursday 28th April 2022 and 07:00 hrs Wednesday 4th May 2022 shows a period of mainly dry and calm weather. There was a period of light rainfall on Sunday 1st May, however, this rainfall does not appear to have significantly influenced the noise dataset.

The weather conditions obtained for the noise survey period are summarised in Figure A7 of Appendix A.

4.4 Unattended Noise Survey Results

The results of the unattended noise measurement survey are presented graphically in Figure A8 of Appendix A, tabulated in Table B1 of Appendix B and summarised overleaf in Table 4.4.

Date	Measured Noise Levels, dB ^[1]					
	Daytime (07:00 - 23:00)			Night-time (23:00 - 07:00)		
	L _{Amax,F}	L _{Aeq,16hr}	L _{A90,16hr}	L _{Amax,F}	L _{Aeq,8hr}	L _{A90,8hr}
Thu 28/04/22 ^[1]	63(54-91)	50	40	57(44-66)	46	30
Fri 29/04/22	62(56-75)	50	41	56(36-73)	45	29
Sat 30/04/22	63(56-89)	50	39	55(31-71)	46	26
Sun 01/05/22	62(56-78)	50	39	55(43-65)	45	25
Mon 02/05/22	63(54-73)	50	38	55(34-69)	46	27
Tue 03/05/22	61(56-74)	50	42	55(43-71)	47	27
Average	62(61-63)	50	40	56(55-57)	46	27

TABLE 4.4: SUMMARY OF UNATTENDED NOISE MEASUREMENTS, N1

Note: [1] incomplete daytime period due to equipment setup.

The results of the unattended noise measurement show that ambient day time L_{Aeq,16hr} sound levels produced an arithmetic average of 50 dB L_{Aeq,16hr}. The ambient night-time L_{Aeq,8hr} sound levels produced an arithmetic average of 46 dB L_{Aeq,8hr}.

4.5 Attended Commercial Noise Survey Results

The results of the attended noise measurements obtained on Wednesday 4th May 2022 are summarised in Table 4.6 below.

Monitoring Location	Floor	Date	Start Time	Duration (mins)	Measured Noise Levels, dB			Observations
					L _{Amax,F}	L _{Aeq,T}	L _{A90,T}	
N1	Ground	04/05/2022	12:30	60	78.0	51.6	45.1	Road traffic passes on A29 dominates ambient; overhead aircrafts were noted overhead and occurs through monitoring period; birdsong through; Commercial noise consists of vehicle idles and/or movements occur at 12:30:00 for 40 seconds, 12:36:30 for 140 seconds, 12:41:40 for 10 seconds, 12:43:20 for 10 seconds, 12:49:00 for 20 seconds, 13:09:20 for 10 seconds, 13:11:50 for 10 seconds, 13:20:50 for 10 seconds, 13:25:30 for 20 seconds and 13:26:20 for 20 seconds; tonal reverse alarm noted on some vehicles but not all.

TABLE 4.5: SUMMARY OF ATTENDED NOISE MEASUREMENT RESULTS

The results of the identified periods of commercial noise during the attended noise monitoring, derived from the $L_{Aeq, 10sec}$ measurement periods, are presented overleaf in Table 4.6.

Attended Monitoring Location	Activity Description	Date	Measurement Start Time (hh:mm:ss)	Total Duration of Observed Commercial Activity (Secs)	Measured Sound Levels, dB		Isolated SPL, dB $L_{Aeq,T}$ (a minus b)
					(a) Sound Source plus Residual SPL, dB $L_{Aeq,T}^{[1]}$	(b) Residual SPL, dB $L_{Aeq,T}^{[2]}$	
N1	HGV movements within Spring Corpse Business Park and on access road to Slinfold Business Park	23/09/2021	12:30	290	51.8	49.3	48.2

TABLE 4.6: SUMMARY OF IDENTIFIED COMMERCIAL NOISE DURING ATTENDED NOISE MEASUREMENT PERIOD

Notes:

[1] Derived from the $L_{Aeq, 10sec}$ measurements when the commercial sound sources were active and the levels were unaffected by any other sound sources; and

[2] The residual sound level was derived from the $L_{Aeq, 10sec}$ measurements, measured when the specific sound was not operating and when conditions contributing to the fluctuations in the residual sound were similar to those when the ambient sound level was measured.

5 NOISE ASSESSMENT

5.1 BS 4142:2014+A1:2019 – Assessment of Commercial Noise

Immediately to the north of site is the Spring Corpse business park. The access road to the Slinfold Business Park is also located to the south east of the site. During the attended noise survey, noise from the Spring Corpse business park operations and vehicles on the Slinfold Business Park access road was audible at the monitoring location.

Noise measurements made at N1, are considered to be representative of the closest proposed residential façade and the measured noise levels from commercial activity has been used to derive Rating Levels from the industrial premises operations to be assessed using the principles of BS 4142.

Whilst on-site, the consultant liaised with the industrial premises', namely Heason Technology Ltd and Cordek Ltd. Representatives of these companies indicated both their operating hours were 08:00 to 17:00 hrs Monday to Friday. However, Cordex Ltd indicated that HGV's may operate between 07:00hrs and 18:00hrs Monday to Friday, with approximately 1 vehicle movement per hour.

The method for predicting the significance of sound of an industrial and/or commercial nature in accordance with the principles of BS 4142:2014+A1:2019 is based on a comparison of the rating level, defined as the specific sound level plus any adjustment for the characteristic features of the sound, with the background sound level, $L_{A90,T}$.

Background Sound Level ($L_{A90,T}$)

'Typical' background sound levels observed over the period of interest, as described in BS4142:2014+A1:2019, are usually established for assessing plant and activities of this kind, with BS4142 stating that a 'representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value'.

N1 is considered representative of the development site and the unattended noise monitoring period provides an indication of the long-term variation in sound levels.

Owing to the potential influence of industrial sound on site between 07:00hrs and 18:00hrs Monday to Friday, the data collected during these hours have not been used. Instead, the background sound level has been established using the 'shoulder hour' periods before and after the operating hours (between 06:00hrs and 07:00hrs and between 18:00hrs and 19:00hrs). Noise levels measured on Monday 2nd May 2022 have also been excluded from the analysis due to this being a bank holiday.

Modal statistical analysis of the background $L_{A90,T}$ sound levels for the periods described above has been undertaken and is presented in Figure A9 of Appendix A.



Using this statistical analysis, a background sound level of 44 dB $L_{A90,1hr}$ has been adopted as the background sound assessment level for assessing the industrial noise rating levels calculated at the proposed residential receptor.

Specific Sound Level ($L_{A90,T}$)

Sources of sound observed on site from the industrial premises were as follows:

- HGV idles/ movements and other vehicle movements.

Based on the observations made of industrial operations, the sample sound levels measured are considered to be representative of a typical period of operations during their opening hours.

During the 1-hour measurement period, there was a total of 290 seconds of commercial activity observed. It has been assumed that this is typical of the business premises' working operations. As such, a $10 \cdot \log(290/3600)$ time correction has been added to the derived specific sound level presented in Table 4.6 above.

Rating Levels

Where appropriate, a rating penalty for sound based on a subjective assessment of its characteristics should be established and added to the Specific Sound Level.

The rating levels presented below in Table 5.1 have been derived to assess the impact of sound from the industrial operations on the proposed development. These rating levels have been calculated by applying a character correction to the specific noise level to derive rating levels that account for the nature of general site activity sound.

Measurement Location	Specific Sound Level $L_{Aeq,Tr}$	BS 4142 Feature Correction, dB	Rating Level, dB $L_{Ar, Tr}$
N1	37 ^[1]	+4	41

TABLE 5.1: BS 4142 RATING LEVELS

Note: Includes a $10 \cdot \log(290/3600)$ time correction.

The assumed character correction has been applied to the specific noise level to derive the Rating Level to account for the tonal reversing alarms being clearly perceptible at the measurement location and across the development site.

Assessment

Comparison of the derived Rating Level with the background sound assessment level, and the resulting level differences, are presented below in Table 5.2.

Measurement Location	Rating Level, dB $L_{Ar, Tr}$	Background Sound Assessment Level, $L_{A90,T}$	Level Difference, dB
N1	41	44	-3

TABLE 5.2: BS 4142 ASSESSMENT



According to BS4142, where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context. The preferred local authority criteria of a rating level to be no greater than the existing background level is also achieved.

The potential impact needs to be considered in the context of the existing ambient noise environment. As discussed in section 3.7, where new dwellings are introduced into an area where commercial noise forms part of the existing baseline noise conditions, it is also appropriate to consider alternative criteria in addition to BS4142, to inform the appropriateness of a new noise sensitive receptor and the extent of required noise mitigation.

In consideration of this, an assessment of internal noise levels following the criteria set out in BS8233:2014 and WHO guidelines, has been undertaken. This assessment considers all ambient noise, including road noise, as well as the commercial noise component.

5.2 BS 8233 Assessment

Assessment of External Noise Levels

BS 8233 provides guidance on noise levels for outdoor amenity areas. This guidance indicates that a desirable level for steady continuous noise should not exceed 50 dB and that 55 dB $L_{Aeq,T}$, should be regarded as an upper limit. Similar guideline levels are presented in the WHO document 'Guidelines for Community Noise' for the identification of 'moderate' and 'serious' annoyance to noise from sources such as road and rail traffic.

The free-field noise levels displayed in Table 4.4 above presents an average $L_{Aeq,16hr}$ noise level of 50 dB. This $L_{Aeq,T}$ level therefore indicate that the BS 8233's lower noise limit of 50 dB $L_{Aeq,T}$ should be achieved across the development in garden and amenity areas.

Assessment of Internal Noise Levels

BS 8233:2014 contains recommended guideline levels of 35 dB $L_{Aeq,T}$ for resting inside bedrooms and living rooms during the daytime, 40 dB $L_{Aeq,T}$ for dining areas and 30 dB $L_{Aeq,T}$ for sleeping inside bedrooms at night.

The approximate sound reduction value provided in Annex G of BS 8233 for a closed insulating glass window unit is 30 dB R_w . With a window open to provide background ventilation, the sound insulation of the window reduces to approximately 15 dB from a free-field level.

Taking this typical sound reduction performance into consideration, and on the understanding that the external facade will consist of block and brick construction, it is clear that the glazing will be the weakest part of the construction and internal noise levels have been predicted inside the dwellings, assuming windows are fully closed or partially open for ventilation purposes.

Internal noise levels have been calculated and are summarised in Table 5.3 below.

Receptor	Measured Daytime Free-Field Noise Level $L_{Aeq,16hr}$	Estimated Daytime Internal Noise Level, dB $L_{Aeq,16hr}$		Measured Night-Time Free-Field Noise Level $L_{Aeq,8hr}$	Estimated Night-Time Internal Noise Level, dB $L_{Aeq,8hr}$	
		Windows Open	Windows Closed		Windows Open	Windows Closed
N1	50	35	20	46	31	16

TABLE 5.3: ASSESSMENT OF ESTIMATED INTERNAL NOISE LEVELS

Notes: - Internal levels based on sound reduction of 30dB with windows closed and 15dB with windows open; and
- Red text indicates exceedance of BS8233 guideline values.

Based on the assumed typical facade reductions, the noise predictions show that internal noise levels are equal to, or remain below, the daytime criterion of 35 dB $L_{Aeq,T}$, with windows partially open and with insulating windows closed, assuming a sound reduction of 15 dB R_w 30dB R_w , respectively.

With windows partially open, the noise predictions show that internal noise levels in habitable rooms will marginally exceed the BS8233:2014 night-time criteria by just 1 dB. The night-time criteria are achieved with windows closed.

An appropriate glazing and ventilation strategy is presented in the following chapter.

Single Event $L_{Amax,F}$ Noise Levels

Single event noise indicators such as maximum $L_{Amax,F}$ noise levels generated at night have also been considered at the proposed development site.

The WHO 2009 guidance sets an internal sleep disturbance noise limit of 42 dB $L_{Amax,F}$ for the onset of critical health effects, which is a level which should not be exceeded on a regular basis. Based on an interpretation that for a noise to be regular, it needs to occur several (i.e. more than two) times per hour, the $L_{Amax,F}$ noise needs to be based upon an average of at least 10-15 events that are typical in nature.

The 1-minute $L_{Amax,F}$ data obtained from the unattended sound level meter (location N1) has been analysed to provide an indication of the nightly number of events that would be expected to result in internal noise levels greater than 42 dB $L_{Amax,F}$.

With a sound attenuation of 30 dB for the scenario with closed windows, there is only 1 no. event over 42 dB $L_{Amax,F}$ during the 8-hour night-time periods throughout the entire unattended noise survey, based on the noise measurement data obtained. With an attenuation of 15 dB for the scenario with open windows, the 42 dB $L_{Amax,F}$ internal noise limit was exceeded up to 111 no. times, with an average of 86 times per night.

The assessment shows that the WHO internal sleep disturbance noise limit would be regularly exceeded (more than 10 times) per night with windows partially open. With windows closed, the WHO internal sleep disturbance noise limit would not be regularly exceeded.

An appropriate glazing and ventilation strategy is presented in the following chapter.

Uncertainty



- The level of uncertainty in the ambient noise survey is minimised by measuring over a 6-day period whilst avoiding adverse weather conditions and in a location representative of the proposed residential receptor;
- The $L_{A90,T}$ background sound level has been derived using the 'shoulder period' hours. The sound levels during this time may be lower during these periods and provide a worst case assessment;
- Rounding has been used in the derivation of the ambient sound level and calculations, to avoid an impression of precision to decimal places;
- Specific sound level operating times - measurements of the commercial operations, while undertaken at a representative location of the property, were carried out within the development boundary; and
- Representative industrial operations - the assessed operations have been based on that seen to be operating during attended site visits.



6 NOISE MITIGATION STRATEGY

6.1 Glazing Strategy

The results of the noise assessment indicate that when assuming a sound reduction of 30dB R_w for a closed insulating window, the recommended internal values provided in BS8233:2014, and the lower adopted internal values, can be achieved at the proposed development.

6.2 Ventilation Strategy

The development will also need to incorporate a background ventilation system in compliance with Approved Document F.

There are four main ventilation systems presented in Approved Document F, for delivering a background ventilation strategy. The ventilation options for living rooms and bedrooms include:

- trickle vents installed in the window units;
- acoustics air bricks installed in the façade; and/or
- passive or mechanical silenced ventilation (whole house or individual).

It is understood that direct air path trickle ventilators would be the preferred ventilation option for the development.

This direct air path trickle ventilation can be fitted into the windows to provide a means of passive ventilation to allow windows to be kept closed if required.

To protect against the ingress of external noise into habitable rooms, it is important to ensure the trickle ventilation system does not compromise the façade insulation or the resulting noise level. As a minimum, the D_{ne} value of the trickle ventilation system should be 30 dB.

6.3 Other Considerations

It was noted during the noise survey that the boundary fence separating the Spring Corpse Business Park and the development site contained gaps at the bottom of the fence. It is recommended that the fence is replaced, or the gaps are filled, to ensure that commercial noise does not penetrate through the barrier and impact the development site.

7 CONCLUSIONS

RF Environmental Ltd (RFE) was commissioned to undertake a noise impact assessment at the proposed residential development at a Former Builders Yard located on Stane Street, Slinfold, West Sussex, RH13 ORE.

The existing noise environment has been established, which is considered representative of the development site, through unattended and attended noise monitoring. Supplementary attended short term measurements were also undertaken, during periods where commercial activities from the adjacent business parks were in operation.

Rating levels of the commercial noise have been calculated and assessed against background sound levels in accordance with British Standard BS 4142:2014+A1:2019.

The assessment indicates that the rating levels at the development site could be 3dB below the existing background levels in the absence of specific noise sources, during the daytime (between 07:00 and 19:00 hrs) period in the absence of the specific noise sources, which indicates the potential for a low noise impact.

It is acknowledged in BS4142:2014 that where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognised that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or as an alternative to BS4142 can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required mitigation.

An assessment of daytime internal noise levels has indicated that recommended guideline levels prescribed in BS8233:2014 will be met if windows are closed or partially open for ventilation.

During the night-time period, for the scenario with closed windows, recommended guideline levels prescribed in BS8233:2014 will be achieved in habitable rooms. With windows open, the recommended guideline levels will be exceeded, however, the criteria is only exceeded by 1 dB, which can be considered negligible.

Night-time WHO $L_{Amax, F}$ guideline values will be achieved in habitable rooms, if windows remain closed, but will be exceeded if are partially open for ventilation.

Suitable, alternative forms of ventilation have been presented. It is understood that direct air path trickle ventilators would be the preferred ventilation option for the development. As a minimum, the D_{ne} value of the trickle ventilation system should be 30 dB.

With the recommended mitigation measures, it is concluded that there should be no reason on noise grounds why the application should be refused planning permission.

APPENDIX A: FIGURES

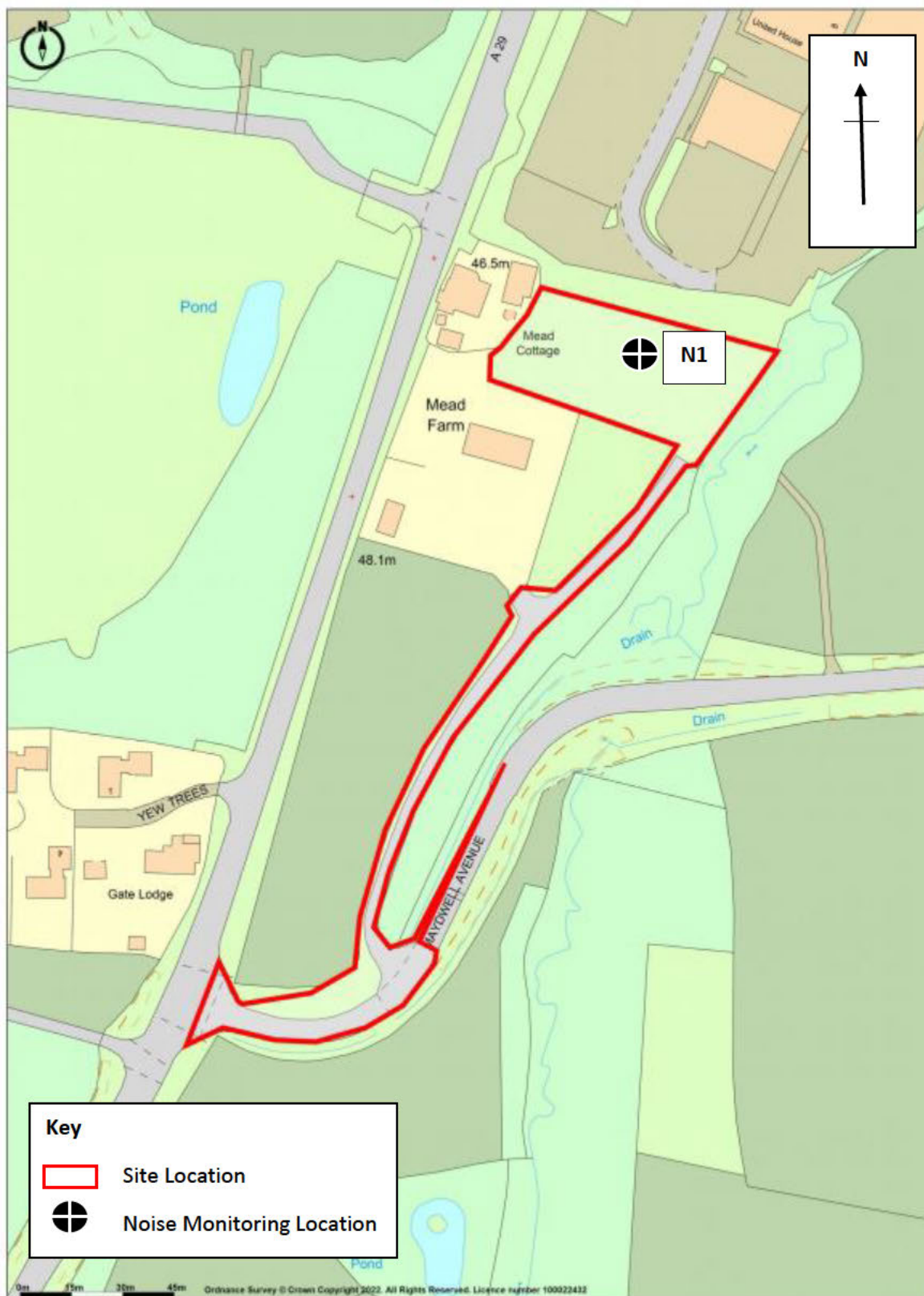


FIGURE A1: LOCATION OF PROPOSED DEVELOPMENT SITE

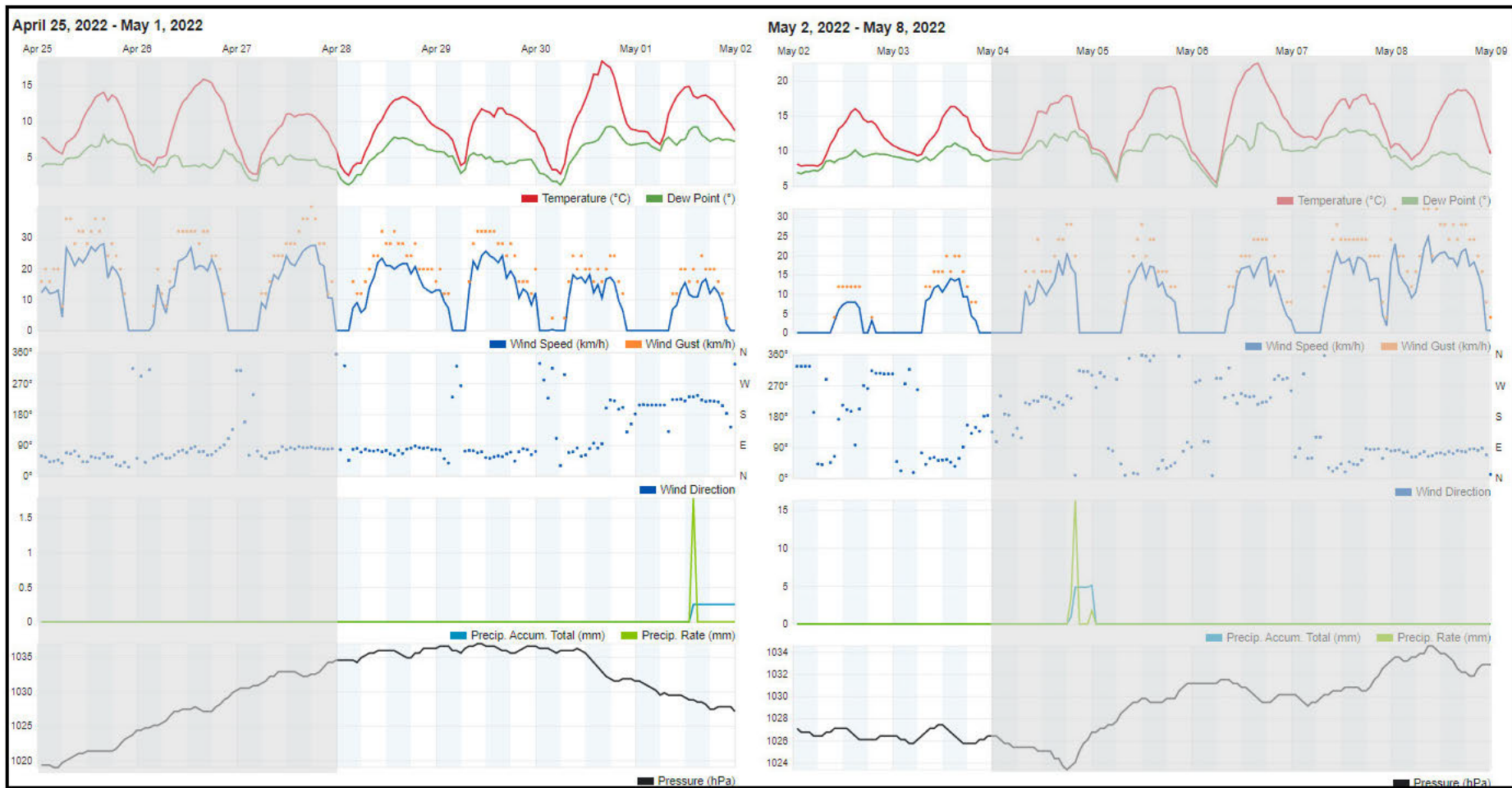


FIGURE A7: WEATHER DATA DURING UNATTENDED NOISE MONITORING PERIOD

Note: Grey highlight indicates periods outside of the noise monitoring period.

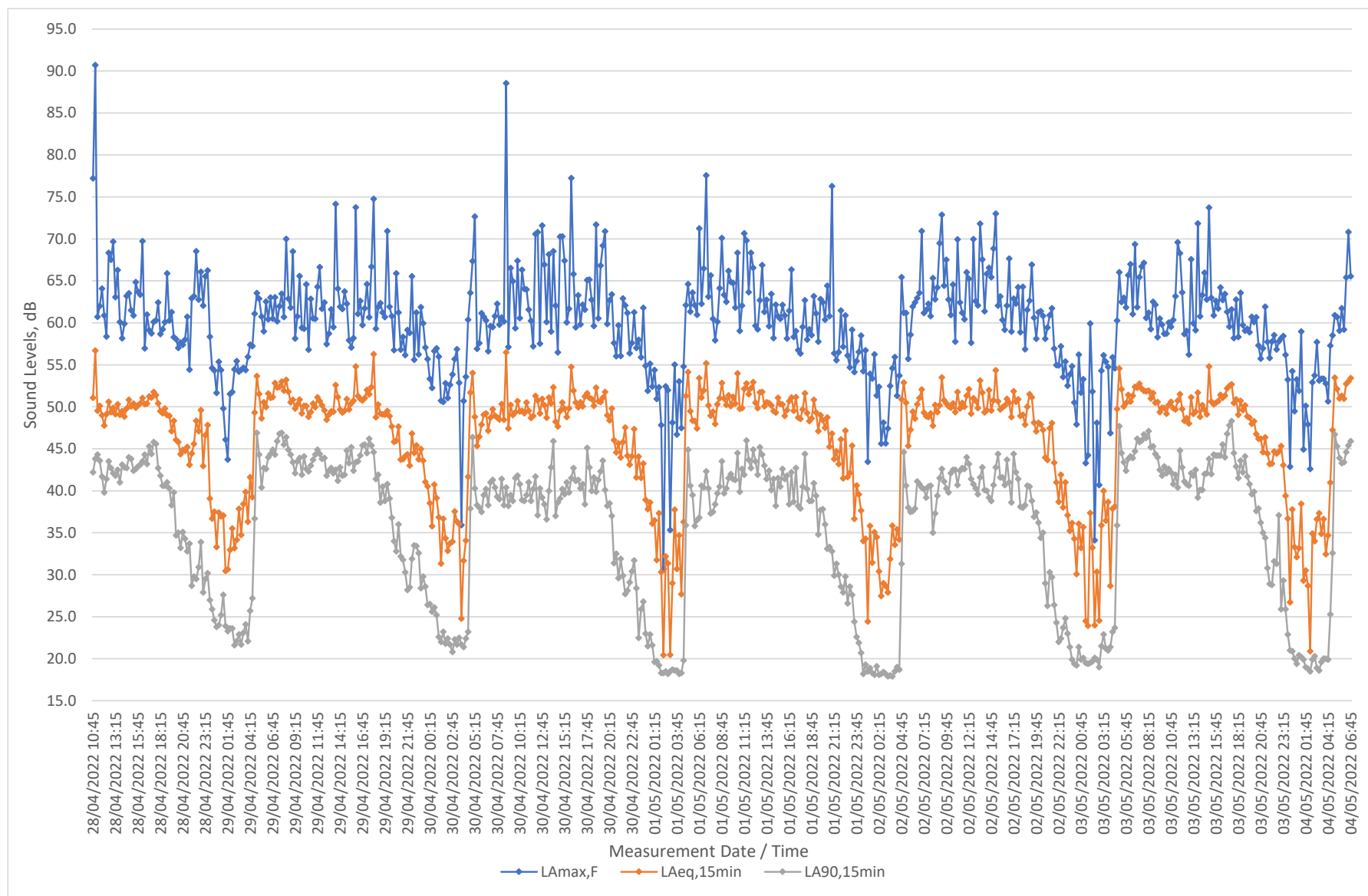


FIGURE A8: TIME HISTORY OF CONTINUOUS NOISE MONITORING DATA, N1

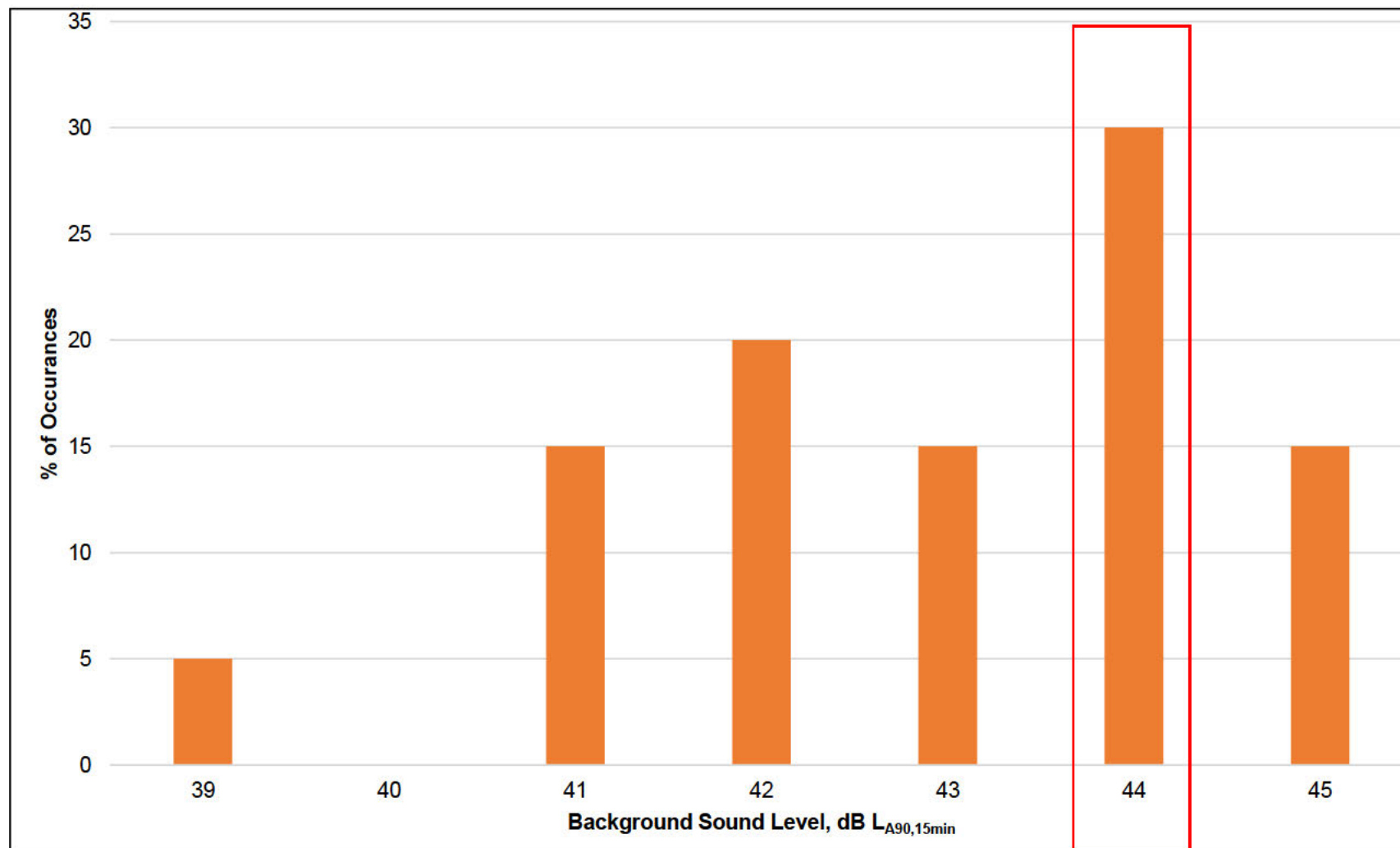


FIGURE A9: DERIVATION OF BACKGROUND SOUND LEVELS – MONDAY TO FRIDAY 06:00HRS TO 07:00HRS AND 18:00HRS AND 19:00HRS

APPENDIX B: TABLES

Date of Meas.	Start Time	Measured Noise Levels, dB		
		L _{Amax,F}	L _{Aeq,15min}	L _{A90,15min}
Thursday 28 th April 2022	10:45	77.2	51.1	42.2
	11:00	90.7	56.7	43.8
	11:15	60.7	49.5	44.3
	11:30	62.0	50.1	43.6
	11:45	64.1	49.0	41.7
	12:00	60.9	47.8	39.8
	12:15	58.4	49.1	41.4
	12:30	68.3	50.6	43.5
	12:45	67.5	49.4	42.7
	13:00	69.7	49.9	42.1
	13:15	63.1	49.1	41.8
	13:30	66.3	50.3	42.5
	13:45	60.1	49.0	41.0
	14:00	58.2	49.5	43.1
	14:15	59.9	48.8	42.8
	14:30	63.2	49.8	42.7
	14:45	63.5	50.8	44.0
	15:00	61.5	50.1	43.8
	15:15	60.9	50.4	42.4
	15:30	64.9	49.9	42.6
	15:45	63.7	50.2	42.9
	16:00	63.4	50.4	43.1
	16:15	69.7	51.0	43.5
	16:30	57.0	50.3	44.3
	16:45	61.0	50.4	43.2
	17:00	59.1	51.2	45.3
	17:15	58.7	51.1	44.4
	17:30	60.1	51.8	45.8
	17:45	60.3	51.4	45.6
	18:00	62.4	50.4	42.7
	18:15	58.7	49.5	41.8
	18:30	59.2	49.2	40.6
	18:45	60.1	49.8	40.6
	19:00	65.9	49.0	41.0
	19:15	60.3	48.9	40.3
	19:30	61.3	47.1	38.3
	19:45	58.3	48.3	39.8
	20:00	58.1	46.1	34.7
	20:15	57.0	45.8	35.0
	20:30	57.7	44.4	33.2
	20:45	57.4	44.9	35.1
	21:00	58.0	44.8	34.3
	21:15	60.7	45.2	32.8
	21:30	54.4	43.1	33.7
	21:45	62.9	44.4	28.7
	22:00	63.2	45.6	29.8
	22:15	68.5	48.3	29.5
	22:30	62.8	47.1	30.9
	22:45	66.1	49.6	33.9
	23:00	62.1	42.9	27.9
	23:15	65.6	46.6	29.5

Friday 29 th April 2022	23:30	66.2	47.8	30.2
	23:45	58.3	39.1	27.0
	00:00	54.6	36.7	25.9
	00:15	54.3	37.5	24.6
	00:30	51.7	33.3	23.8
	00:45	55.4	37.4	24.0
	01:00	54.4	37.0	25.2
	01:15	49.8	37.1	27.6
	01:30	46.1	30.5	23.9
	01:45	43.7	30.7	23.3
	02:00	51.5	33.0	23.6
	02:15	51.8	35.5	23.6
	02:30	54.5	33.2	21.6
	02:45	55.5	34.2	22.1
	03:00	54.2	37.9	22.9
	03:15	54.4	34.7	21.7
	03:30	54.6	38.4	23.1
	03:45	54.4	39.9	24.1
	04:00	56.0	36.3	22.1
	04:15	57.4	41.6	25.7
	04:30	57.2	39.2	27.2
	04:45	61.1	49.3	36.7
	05:00	63.5	53.7	46.9
	05:15	62.9	51.5	44.3
	05:30	60.7	48.6	40.4
	05:45	59.0	50.5	42.7
	06:00	62.5	50.0	42.6
	06:15	60.4	51.6	44.0
	06:30	63.0	51.1	44.4
	06:45	60.5	51.1	44.9
	07:00	63.0	52.8	44.3
	07:15	60.2	52.3	45.9
	07:30	62.0	52.4	46.8
	07:45	63.5	53.0	46.9
	08:00	60.7	51.9	45.5
	08:15	70.0	53.2	46.4
	08:30	62.9	51.8	44.9
	08:45	61.8	50.6	44.3
	09:00	68.5	50.8	43.4
	09:15	58.2	49.8	42.1
	09:30	60.8	50.3	43.5
	09:45	65.6	50.9	43.9
	10:00	59.4	49.2	41.9
	10:15	59.3	50.1	44.1
	10:30	64.6	50.1	42.6
	10:45	56.8	48.8	42.3
	11:00	62.9	49.4	43.0
	11:15	60.5	50.4	43.7
	11:30	60.5	50.0	44.3
	11:45	64.3	51.1	44.9
	12:00	66.6	50.7	44.4
	12:15	61.7	50.2	43.8
	12:30	62.4	49.6	43.9

Saturday 30 th April 2022	12:45	57.5	48.5	41.8
	13:00	58.7	49.1	42.4
	13:15	61.6	49.5	42.7
	13:30	59.5	49.4	42.1
	13:45	74.2	52.6	42.5
	14:00	64.1	51.2	41.2
	14:15	61.9	49.7	42.8
	14:30	61.6	49.3	41.8
	14:45	63.7	49.5	41.9
	15:00	62.3	50.9	44.8
	15:15	57.9	49.7	43.3
	15:30	57.1	50.4	45.2
	15:45	58.2	50.7	42.4
	16:00	73.8	54.8	43.4
	16:15	61.1	51.3	43.5
	16:30	62.6	50.9	44.2
	16:45	59.7	50.8	45.4
	17:00	61.7	51.1	45.5
	17:15	64.6	52.0	44.5
	17:30	60.7	51.5	46.2
	17:45	66.7	52.3	45.4
	18:00	74.8	56.3	44.6
	18:15	59.3	48.8	41.4
	18:30	61.9	50.3	41.9
	18:45	62.3	49.2	38.6
	19:00	61.2	49.1	40.5
	19:15	60.7	49.1	38.8
	19:30	70.9	49.5	40.8
	19:45	61.9	48.9	39.1
	20:00	60.8	47.7	36.8
	20:15	56.8	45.8	34.0
	20:30	65.9	46.0	32.8
	20:45	61.2	47.6	36.0
	21:00	56.8	43.7	32.2
	21:15	58.3	43.8	31.8
	21:30	56.2	44.1	30.3
	21:45	59.2	44.3	28.2
	22:00	58.8	43.0	28.5
	22:15	65.5	46.8	31.9
	22:30	55.6	44.5	33.5
	22:45	61.2	45.4	33.4
	23:00	56.3	43.8	32.6
	23:15	61.9	45.0	28.4
	23:30	59.9	43.6	29.8
	23:45	57.1	41.1	28.6
	00:00	55.7	40.5	26.4
	00:15	53.3	38.5	26.5
	00:30	52.3	35.8	25.6
	00:45	56.6	40.7	26.1
	01:00	57.0	39.1	25.2
	01:15	56.0	36.8	22.6
	01:30	50.7	31.3	22.0
	01:45	50.6	36.7	23.2

	02:00	52.8	34.3	21.8
	02:15	51.0	32.9	22.4
	02:30	52.6	33.7	21.7
	02:45	53.9	33.9	20.8
	03:00	55.7	37.5	22.3
	03:15	56.9	36.3	21.7
	03:30	52.9	36.1	22.5
	03:45	35.9	24.8	21.7
	04:00	50.7	31.7	21.4
	04:15	53.6	34.1	22.4
	04:30	60.4	41.7	23.2
	04:45	63.6	51.7	37.9
	05:00	67.3	54.0	46.4
	05:15	72.7	48.8	40.3
	05:30	56.9	45.3	38.3
	05:45	57.6	46.4	38.0
	06:00	61.1	47.9	37.5
	06:15	60.7	49.0	39.5
	06:30	60.3	49.2	40.2
	06:45	56.6	47.2	38.3
	07:00	59.6	48.7	41.0
	07:15	59.5	49.7	41.3
	07:30	60.8	49.0	40.4
	07:45	62.3	48.7	39.3
	08:00	59.8	48.5	39.0
	08:15	60.6	50.3	41.4
	08:30	60.2	48.5	38.3
	08:45	88.5	56.5	40.4
	09:00	57.1	47.4	38.2
	09:15	66.5	50.2	39.5
	09:30	65.0	49.0	38.8
	09:45	59.4	49.3	41.5
	10:00	67.4	50.7	41.8
	10:15	60.6	49.4	40.8
	10:30	66.3	49.5	38.9
	10:45	64.0	49.2	38.8
	11:00	64.0	50.5	39.5
	11:15	61.6	49.5	41.0
	11:30	60.2	48.7	38.8
	11:45	57.2	48.9	40.2
	12:00	70.6	51.3	41.7
	12:15	70.8	50.8	37.1
	12:30	57.5	49.2	40.3
	12:45	71.6	50.9	39.2
	13:00	66.9	50.2	38.4
	13:15	60.1	48.7	36.6
	13:30	68.1	51.1	40.0
	13:45	59.0	50.4	42.8
	14:00	68.5	52.3	45.9
	14:15	62.0	48.2	37.0
	14:30	56.5	47.7	38.6
	14:45	70.3	49.5	39.1
	15:00	70.3	50.5	40.2

Sunday 1 st May 2022	15:15	67.4	49.8	39.6
	15:30	60.0	48.8	41.0
	15:45	61.7	49.8	39.8
	16:00	77.2	54.8	41.5
	16:15	65.8	51.9	42.7
	16:30	59.5	50.5	41.2
	16:45	63.3	50.0	41.3
	17:00	59.8	50.6	40.3
	17:15	62.2	50.1	40.8
	17:30	61.6	51.2	38.4
	17:45	65.1	51.6	45.1
	18:00	65.2	51.1	42.8
	18:15	62.8	50.9	40.0
	18:30	59.6	50.1	41.6
	18:45	71.7	52.3	39.9
	19:00	60.5	50.7	41.3
	19:15	66.8	50.6	42.3
	19:30	69.2	51.1	43.6
	19:45	70.9	51.8	40.1
	20:00	59.9	49.0	38.2
	20:15	62.7	48.4	38.5
	20:30	63.4	49.8	37.0
	20:45	57.6	46.1	31.4
	21:00	56.0	44.6	32.5
	21:15	59.7	45.7	29.6
	21:30	56.1	44.0	31.9
	21:45	62.9	45.8	29.9
	22:00	62.1	47.5	27.7
	22:15	61.2	44.2	28.1
	22:30	56.4	43.1	29.1
	22:45	57.6	44.1	30.4
	23:00	61.3	47.3	31.7
	23:15	57.0	41.6	28.4
	23:30	58.0	44.1	22.5
	23:45	55.9	41.5	25.9
	00:00	61.8	43.2	26.8
	00:15	54.9	38.9	23.0
	00:30	51.9	37.8	21.5
	00:45	55.1	38.6	22.9
	01:00	52.4	36.1	21.6
	01:15	54.4	36.5	19.6
	01:30	51.0	31.8	19.7
	01:45	52.3	37.3	19.2
	02:00	47.8	30.3	18.3
	02:15	30.7	20.4	18.3
	02:30	52.4	32.2	18.5
	02:45	52.0	31.4	18.2
	03:00	35.3	20.5	18.5
	03:15	48.1	29.0	18.7
	03:30	55.0	37.7	18.6
	03:45	46.7	30.7	18.6
	04:00	53.0	34.7	18.2
	04:15	47.5	27.7	18.3

	04:30	54.8	36.3	19.8
	04:45	62.1	51.3	35.9
	05:00	64.6	54.1	44.9
	05:15	61.3	49.5	40.6
	05:30	63.6	48.4	39.5
	05:45	62.1	48.3	35.8
	06:00	61.0	47.4	36.5
	06:15	71.2	53.4	36.8
	06:30	62.3	51.1	40.6
	06:45	66.5	52.0	40.4
	07:00	77.6	55.2	42.3
	07:15	63.1	50.2	40.3
	07:30	65.6	48.9	37.3
	07:45	60.5	49.4	37.5
	08:00	57.9	48.0	38.4
	08:15	60.1	50.3	39.7
	08:30	64.1	51.0	40.5
	08:45	70.1	52.8	43.5
	09:00	63.3	51.0	39.7
	09:15	62.5	50.2	40.3
	09:30	66.2	51.4	41.5
	09:45	64.9	50.1	42.0
	10:00	64.8	51.2	41.4
	10:15	61.8	50.4	41.3
	10:30	68.4	54.0	44.5
	10:45	59.0	49.8	39.9
	11:00	62.1	49.9	42.6
	11:15	70.7	52.1	41.9
	11:30	69.8	52.8	46.0
	11:45	63.6	51.5	43.7
	12:00	68.3	52.2	42.7
	12:15	66.5	53.0	44.9
	12:30	59.7	50.5	43.5
	12:45	59.2	49.9	41.9
	13:00	62.7	51.7	45.2
	13:15	66.9	51.8	44.3
	13:30	61.3	50.1	43.0
	13:45	62.8	50.5	41.4
	14:00	59.6	50.4	42.4
	14:15	63.4	50.2	40.1
	14:30	58.2	49.5	41.4
	14:45	62.2	49.3	38.2
	15:00	60.8	51.1	41.5
	15:15	60.5	50.3	40.5
	15:30	62.1	50.3	42.6
	15:45	60.9	48.9	41.4
	16:00	58.1	49.6	41.8
	16:15	61.4	50.7	38.4
	16:30	66.3	51.1	42.2
	16:45	58.3	49.5	38.7
	17:00	59.0	51.2	42.7
	17:15	56.8	48.7	38.2
	17:30	56.4	48.6	37.9

Sunday 2 nd May 2022	17:45	59.5	49.7	40.5
	18:00	62.7	51.6	44.4
	18:15	58.0	49.3	40.2
	18:30	59.2	48.3	38.8
	18:45	58.5	48.6	38.8
	19:00	63.2	50.8	40.9
	19:15	61.1	49.3	39.4
	19:30	57.8	47.1	34.8
	19:45	62.8	49.0	37.7
	20:00	62.5	48.4	37.8
	20:15	60.4	47.5	36.0
	20:30	64.4	48.7	33.1
	20:45	60.8	45.2	33.3
	21:00	76.3	46.8	32.8
	21:15	56.4	43.8	29.9
	21:30	55.6	44.7	31.3
	21:45	56.5	43.2	30.0
	22:00	61.5	46.1	28.6
	22:15	57.2	41.5	27.9
	22:30	60.9	47.2	29.8
	22:45	56.1	41.7	26.6
	23:00	54.7	42.1	28.6
	23:15	59.2	45.4	27.6
	23:30	54.1	36.7	24.4
	23:45	55.4	40.6	22.6
	00:00	56.5	39.6	21.9
	00:15	58.5	37.6	20.7
	00:30	54.2	34.0	18.2
	00:45	56.7	34.3	19.3
	01:00	43.5	24.4	18.5
	01:15	53.9	35.8	18.9
	01:30	53.4	31.4	18.3
	01:45	56.2	35.1	18.1
	02:00	51.3	34.5	19.1
	02:15	52.4	30.4	18.1
	02:30	45.6	27.5	18.2
	02:45	48.1	29.0	18.4
	03:00	45.6	28.7	18.2
	03:15	47.4	27.9	17.9
	03:30	52.5	31.9	18.0
	03:45	54.6	35.8	17.9
	04:00	55.9	33.6	18.5
	04:15	51.3	35.4	19.0
	04:30	53.7	34.2	18.7
	04:45	65.4	50.9	31.3
	05:00	61.2	52.9	44.6
	05:15	61.2	50.5	40.6
	05:30	55.7	45.4	38.0
	05:45	58.6	47.3	37.5
	06:00	61.9	49.4	37.6
	06:15	62.4	48.6	37.9
	06:30	63.0	50.3	41.1
	06:45	63.6	51.1	40.8

	07:00	70.9	52.1	40.4
	07:15	61.2	49.3	40.2
	07:30	61.5	48.9	39.2
	07:45	62.3	48.8	40.5
	08:00	60.8	49.2	40.6
	08:15	65.3	47.8	35.0
	08:30	62.8	50.2	37.3
	08:45	64.2	49.4	39.4
	09:00	69.5	50.2	41.5
	09:15	72.9	53.5	42.6
	09:30	64.4	50.8	41.1
	09:45	67.5	50.4	40.3
	10:00	62.8	50.1	39.8
	10:15	60.9	49.9	42.1
	10:30	64.6	50.4	42.5
	10:45	57.8	49.4	42.5
	11:00	69.9	51.8	40.7
	11:15	62.4	49.8	42.4
	11:30	61.2	50.5	42.7
	11:45	60.4	50.0	42.6
	12:00	66.0	51.3	44.0
	12:15	65.3	52.1	43.2
	12:30	57.6	49.2	41.4
	12:45	70.0	51.0	40.8
	13:00	62.6	50.7	40.3
	13:15	62.1	49.8	39.6
	13:30	71.8	53.1	41.6
	13:45	67.5	51.7	42.8
	14:00	61.4	49.3	40.1
	14:15	65.8	49.6	40.0
	14:30	66.6	52.0	39.2
	14:45	65.4	49.6	38.8
	15:00	68.8	50.8	40.7
	15:15	73.0	54.4	42.8
	15:30	62.1	50.6	44.4
	15:45	63.1	49.7	41.6
	16:00	60.3	49.9	41.6
	16:15	59.2	50.2	40.7
	16:30	62.1	50.9	43.7
	16:45	67.6	50.5	41.0
	17:00	59.0	48.8	38.6
	17:15	62.9	51.9	44.4
	17:30	62.3	50.6	42.2
	17:45	64.2	50.9	41.4
	18:00	58.9	48.9	38.1
	18:15	64.3	49.1	38.0
	18:30	56.9	47.9	38.3
	18:45	61.6	50.0	40.6
	19:00	62.6	51.5	40.5
	19:15	66.9	51.1	38.8
	19:30	60.6	48.1	36.9
	19:45	58.1	47.1	37.4
	20:00	61.3	48.1	36.2

Monday 3 rd May 2022	20:15	61.4	47.9	34.4
	20:30	60.8	47.3	35.0
	20:45	58.1	44.0	29.0
	21:00	59.5	43.7	26.3
	21:15	60.9	47.5	30.3
	21:30	61.7	48.1	29.7
	21:45	56.9	43.3	26.4
	22:00	55.0	41.0	24.3
	22:15	54.9	38.7	22.0
	22:30	57.2	41.9	22.4
	22:45	53.5	38.0	23.7
	23:00	55.4	41.0	24.8
	23:15	52.5	37.1	23.0
	23:30	53.8	35.2	21.4
	23:45	54.8	36.2	19.9
	00:00	50.5	34.3	19.4
	00:15	47.9	30.1	19.2
	00:30	56.2	36.1	21.4
	00:45	51.7	33.2	19.9
	01:00	53.3	35.7	20.1
	01:15	43.3	24.5	19.5
	01:30	44.2	23.9	19.4
	01:45	59.9	37.4	19.5
	02:00	51.8	33.2	19.7
	02:15	34.1	24.0	20.1
	02:30	48.1	30.4	19.9
	02:45	40.7	24.5	19.0
	03:00	54.3	35.9	21.5
	03:15	56.1	40.0	22.9
	03:30	55.4	36.4	21.2
	03:45	54.7	38.7	21.0
	04:00	46.9	28.7	21.4
	04:15	55.9	37.9	23.2
	04:30	54.6	38.1	23.7
	04:45	60.3	49.7	35.9
	05:00	66.0	54.6	47.7
	05:15	62.5	52.1	44.5
	05:30	63.0	50.0	43.4
	05:45	61.9	50.4	42.4
	06:00	65.7	51.4	43.8
	06:15	67.0	50.6	44.1
	06:30	61.0	51.3	43.9
	06:45	69.4	52.4	44.7
	07:00	61.9	52.3	46.2
	07:15	65.4	52.8	45.8
	07:30	66.7	52.2	46.0
	07:45	67.1	51.9	46.7
	08:00	60.6	51.8	46.3
	08:15	61.2	51.9	47.1
	08:30	59.3	51.0	45.2
	08:45	62.5	51.6	45.3
	09:00	62.2	50.5	44.4
	09:15	58.3	50.6	44.0

	09:30	60.5	49.4	42.5
	09:45	59.8	49.9	41.8
	10:00	58.7	49.8	42.9
	10:15	58.7	49.2	42.1
	10:30	60.0	50.2	42.6
	10:45	59.5	50.6	42.2
	11:00	60.3	49.8	40.8
	11:15	63.2	49.7	41.9
	11:30	69.6	50.7	40.4
	11:45	68.3	51.5	44.8
	12:00	63.6	49.7	42.8
	12:15	58.7	48.3	41.1
	12:30	59.0	48.6	40.8
	12:45	56.2	48.0	40.6
	13:00	67.6	51.1	42.1
	13:15	59.9	49.2	41.8
	13:30	59.1	49.4	42.5
	13:45	71.8	51.7	39.2
	14:00	60.8	48.8	40.1
	14:15	63.3	50.2	40.1
	14:30	66.0	49.6	42.0
	14:45	62.8	49.1	42.1
	15:00	73.7	54.8	43.8
	15:15	63.0	50.6	42.0
	15:30	60.9	50.3	44.3
	15:45	62.6	50.5	44.2
	16:00	61.7	50.7	44.2
	16:15	64.2	51.4	44.2
	16:30	62.7	51.1	45.5
	16:45	63.5	51.3	44.0
	17:00	61.3	52.2	46.8
	17:15	59.6	52.5	47.8
	17:30	61.6	52.7	48.3
	17:45	58.2	50.5	44.5
	18:00	62.8	50.9	42.9
	18:15	58.3	49.1	41.5
	18:30	63.6	50.7	43.6
	18:45	59.7	49.6	42.2
	19:00	59.1	50.2	44.1
	19:15	59.3	48.9	41.7
	19:30	58.9	48.7	40.8
	19:45	60.7	48.0	39.6
	20:00	60.1	48.3	39.9
	20:15	60.7	46.8	37.6
	20:30	57.3	46.2	37.9
	20:45	55.7	46.2	36.2
	21:00	57.0	44.6	35.0
	21:15	61.9	46.4	34.4
	21:30	57.7	44.5	30.8
	21:45	55.8	43.2	28.9
	22:00	57.8	43.2	28.8
	22:15	58.5	44.7	31.6
	22:30	56.8	44.4	31.3

	22:45	57.8	44.7	37.1
	23:00	58.2	45.3	25.9
	23:15	58.4	43.1	29.3
	23:30	56.2	39.4	25.9
	23:45	53.2	36.7	22.9
	00:00	42.9	26.7	21.0
	00:15	54.2	37.8	20.9
	00:30	49.5	33.3	20.0
	00:45	53.3	32.1	19.4
	01:00	51.9	33.2	20.4
	01:15	59.0	38.4	20.2
	01:30	44.9	29.3	19.9
	01:45	50.1	30.5	19.0
	02:00	47.9	28.7	18.8
	02:15	42.6	20.9	18.5
	02:30	52.9	34.9	19.9
	02:45	53.8	34.0	20.3
	03:00	57.7	36.6	18.9
	03:15	53.1	37.3	18.6
	03:30	53.3	34.9	19.6
	03:45	53.3	36.6	20.0
	04:00	52.8	32.4	20.0
	04:15	50.6	34.7	19.9
	04:30	57.3	41.0	25.3
	04:45	58.5	47.2	32.6
	05:00	60.9	53.5	46.7
	05:15	60.7	52.1	45.3
	05:30	59.1	51.0	43.9
	05:45	61.7	51.3	43.3
	06:00	59.2	51.0	43.4
	06:15	65.4	52.7	44.6
	06:30	70.8	53.0	45.4
	06:45	65.6	53.4	45.9

TABLE B1: CONTINUOUS NOISE MONITORING DATA – THURSDAY 28TH APRIL 2022 TO TUESDAY 3RD MAY 2022

APPENDIX C: GLOSSARY OF ACOUSTIC TERMS

Noise

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA corresponds to a doubling/ halving in perceived loudness. Noise is measured on a logarithmic scale in decibels (dB) because of the ears' sensitivity to a wide range of pressure changes. The sound pressure level (SPL) of a signal is denoted by the symbol L_p and defined by the equation $L_p = 10 \log (p/p_0)^2$ where p is the root mean square pressure of the signal and p_0 is the reference sound pressure (2×10^{-5} Pa).

An indication of the range of sound pressure levels commonly found in the environment is given below:

Location	$L_{pA dB(A)}$
Normal threshold of hearing	-10 to 20
Music halls and theatres	20 to 30
Living rooms and offices	30 to 50
Inside motor vehicles	50 to 70
Industrial premises	70 to 100
Burglar alarms at 1 m	100 to 110
Jet aircraft on take-off	110 to 130
Threshold of pain	130 to 140

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is “equivalent continuous A-weighted sound pressure level, in decibels” and is defined in British Standard BS 7445 as the “value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T , has the same mean square sound pressure as a sound under consideration whose level varies with time”.

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

Community response to environmental noise sources is dependent on both acoustic and non-acoustic factors. The acoustic factors include absolute noise level, changes or exceedances of background and ambient levels as well as the characteristics, time, duration and frequency of noise.